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NATIONAL DAM SAFETY PROGRAM. HUNTING CAMP DAM (INVENTORY NUMBER--ETC(U)
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AUGUST 1979

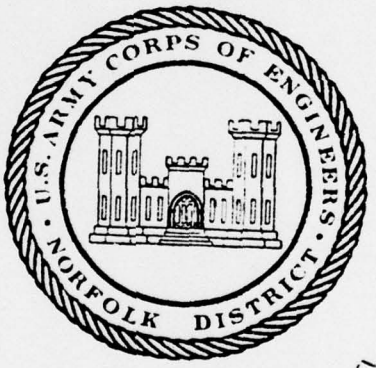
Name Of Dam: HUNTING CAMP DAM

Location: BLAND COUNTY, VIRGINIA

Inventory Number: VA. NO. 02101

LEVEL II

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



PREPARED FOR

NORFOLK DISTRICT CORPS OF ENGINEERS
803 FRONT STREET
NORFOLK, VIRGINIA 23510

BY

SCHNABEL ENGINEERING ASSOCIATES, P.C./
J. K. TIMMONS AND ASSOCIATES, INC.

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NAME OF DAM: HUNTING CAMP DAM
LOCATION: BLAND COUNTY, VIRGINIA
INVENTORY NUMBER: VA. NO. 02101

(6) National Dam Safety Program. Hunting Camp Dam (Inventory Number VA Ø21Ø1), Bland County, Virginia. Phase I Inspection Report.

(9) Final rept.,

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

(10) James A. Walsh (11) Aug 79

(12) 64 (15) DACW65-79-D-ØØØ4

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

SECURITY CLASSIFICATION OF THIS PAGE (When ...

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20. Abstract

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

Phase I reports include project information of the dam and appurtenances, all existing engineering data, operational procedures, hydraulic/hydrologic data of the watershed, dam stability, visual inspection report and an assessment including required remedial measures.

TABLE OF CONTENTS

Name of Dam: Hunting Camp Dam Va. No. 02101
State: Virginia
County: Bland
USGS Quad Sheet: Big Bend
Coordinates: Lat 37° 06.3' Long 81° 14.1'
Stream: Hunting Camp Creek
Date of Inspection: May 22, 1979

BRIEF ASSESSMENT OF DAM

Hunting Camp Dam is a homogeneous earthfill structure about 700 ft long and 22 ft high. The principal spillway consists of a 42 inch corrugated metal pipe riser and a 30 inch corrugated metal pipe which extends through the structure. There are two emergency spillways which are 135 ft and 40 ft wide vegetated earth channels. The dam is located on Hunting Camp Creek about 1.6 miles southwest of Suiter, Virginia. The dam was constructed for recreational purposes in 1956 and is owned and maintained by Consolidation Coal Company, Pocahontas, Virginia.

The emergency spillways will pass 60 percent of the Probable Maximum Flood (PMF) prior to overtopping. Based on criteria established by the Department of the Army, office of the Chief of Engineers (OCE) the appropriate spillway design flood (SDF) is the ½ PMF. The emergency spillways will pass the ½ PMF with the following maximum values: a depth of 4.4 ft, at a velocity of 14.4 fps, and for a period of 13 hours. The emergency spillways are rated adequate.

The visual inspection revealed no serious problems. The embankment structure appears to have been constructed slightly different than shown on the "design" drawings; however, this deviation is not a serious departure from the design .

An accurate check on stability could not be made since sufficient design data, calculations, and construction data

were not available. The upstream slope of the dam also appears to be slightly steeper than requirements recommended by the U. S. Bureau of Reclamation for small homogeneous dams subject to rapid drawdown. Therefore, we recommend that the water level in the lake not be lowered at a rate exceeding 6 inches/day. If this is not acceptable, the owner should then have a geotechnical engineering study performed to evaluate in detail the stability condition of the dam.

Overall, the dam appeared to be in satisfactory condition at the time of the inspection. However, the following remedial measure is recommended:

(1) A staff gauge should be installed to monitor water levels.

The following routine maintenance and observation functions should be initiated immediately:

Vegetation should be routinely controlled. The slopes and crest of the structure and the spillways should be mowed twice per year and all existing small trees or sapplings removed. Seepage present along the downstream toe, particularly along the left side, should be monitored quarterly to detect any increase in flow rates which may cause piping within the embankment. The eroded area near the red building on the left downstream slope should be examined during maintenance operations to detect any increased erosion and the development of seepage. The upstream slope includes a continuous wave cut face, which should be monitored quarterly to see if it has stabilized. If erosion continues, then corrective remedial measures are recommended.

Prepared by:

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Chief, Engineering Division

Date: SEP 14 1979

OVERVIEW PHOTOGRAPH

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
HUNTING CAMP DAM NO. 02101

SECTION 1 - PROJECT INFORMATION

1.1 General:

1.1.1 Authority: Public Law 92-367, 8 August 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of safety inspections of dams throughout the United States. The Norfolk District has been assigned the responsibility of supervising the inspection of dams in the Commonwealth of Virginia.

1.1.2 Purpose of Inspection: The purpose is to conduct a Phase I inspection according to the Recommended Guidelines for Safety Inspection of Dams (See Reference 1, Appendix V). The main responsibility is to expeditiously identify those dams which may be a potential hazard to human life or property.

1.2 Project Description:

1.2.1 Dam and Appurtenances: Hunting Camp Dam is a homogeneous earthfill structure approximately 700 ft long and 22 ft high.* The top of the dam is 15 ft wide and is at elevation 2370 M.S.L. Side slopes are approximately 2.9 horizontal to 1 vertical (2.9) on the downstream side and 2.7 horizontal to 1 vertical (2.7:1) on the upstream side.

*Height is measured from the top of the dam to the downstream toe.

The principal spillway consists of a 42-inch diameter corrugated metal riser pipe and a 30-inch corrugated metal outlet pipe running through the dam. The riser crest is at elevation 2363 M.S.L. and the 30-inch outlet pipe is at elevation 2351 M.S.L. The riser has a 12-inch diameter inlet at elevation 2351 M.S.L., which is used to drain the lake. (See Plate Nos. 2-5, Appendix I).

There is an emergency spillway at the left abutment which is a vegetated earth channel with a bottom width of 135 ft and 2:1 side slopes. The crest elevation is 2365 M.S.L. The bottom and left side of the emergency spillway is in a cut and the right side is in fill.

There is also an emergency spillway at the right abutment which is a vegetated earth channel with a bottom width of 40 ft and 2:1 side slopes on the left and 1:1 side slopes on the right. The crest elevation is 2366 M.S.L. The bottom and right side of the spillway is in a cut while the left side is in fill.

1.2.2 Location: Hunting Camp Dam is located on Hunting Camp Creek, 1.6 miles southwest of Suiter, Virginia (See Plate 1, Appendix I). The impoundment is popularly known as Pocahontas Fuel Lake.

1.2.3 Size Classification: The dam is classified as a "small" size structure because of the dam height and maximum storage capacity.

1.2.4 Hazard Classification: The dam is located in a rural, forested area; however, based upon the downstream proximity of

several homes (2500 ft±), farm buildings and Va. Route 615, the dam is assigned a "significant" hazard classification. The hazard classification used to categorize a dam is a function of location only and has nothing to do with its stability or probability of failure.

1.2.5 Ownership: The Consolidation Coal Company owns and operates the dam.

1.2.6 Purpose: Recreation

1.2.7 Design and Construction History: The dam was designed and constructed under the supervision of the U. S. Soil Conservation Service for the Consolidation Coal Company. Construction was by Paul E. Delp of Elk Creek, Virginia. The dam was completed in 1956.

1.2.8 Normal Operational Procedures: The principal spillway is ungated; therefore, water rising above the crest of the riser inlet automatically is discharged downstream. Similarly, water is automatically passed through the emergency spillways in the event of an extreme flood which creates a pool elevation above that of the emergency spillways crests.

1.3 Pertinent Data:

1.3.1 Drainage Areas: The drainage area is 7.27 square miles.

1.3.2 Discharge at Dam Site: Maximum known flood at the dam site occurred in April 1977; however, the pool elevation was not observed.

Principal Spillway Discharges:

Pool Elevation at Crest of Dam 58 CFS

Emergency Spillway Discharge (Right and Left):

Pool at Crest of Dam 14,719 CFS

1.3.3 Dam and Reservoir Data: See Table 1.1, below.

Table 1.1 DAM AND RESERVOIR DATA

Item	Elevation feet M.S.L.	Reservoir Storage Area Acres	Acre Feet	Watershed Inches	Length Miles
Crest of Dam	2370	14.5	211	.54	.4
Emergency Spillway Crest Right	2366	13	157.5	.4	.35
Emergency Spillway Crest Left	2365	12.5	144.5	.36	.3
Principal Spillway Crest	2363	12	120	.3	.3
Streambed at Downstream Toe of Dam	2348	-	-	-	-

SECTION 2 - ENGINEERING DATA

2.1 Design: The dam was designed and constructed under the direction of the U. S. Soil Conservation Service (SCS) for the Consolidation Coal Company. Design data and construction specifications are available in the Bland County field office of the U. S. Soil Conservation Service, Bland, Virginia, 24315. Geologic and stability data were not available.

The dam is a homogeneous compacted earthfill embankment. Design drawings are presented as Plates 2 through 5 of Appendix I. A core trench approximately 10 ft wide was excavated to the top of rock, extending along the axis of the dam and into both abutments. The embankment was to be constructed primarily with clay excavated from borrow pit in the reservoir area. More highly permeable material from the emergency spillways was placed along the outer portions of the downstream slope. The fill was placed in 1 ft$^{\pm}$ layers and compacted with a sheepsfoot roller; however, no density tests were required. Embankment slopes of 3 horizontal to 1 vertical were planned on the upstream and downstream sides. A small berm was included on the upstream slope at elevation 2363 M.S.L. and extended to elevation 2361 M.S.L. with a 5:1 slope before resuming the 3:1 slope to natural ground. Recent field measurements made by the Owner are included as Appendix IV. The survey indicates the upstream slope is approximately 2.7 horizontal to 1 vertical (2.7:1), while the downstream slope is 2.9 horizontal to 1 vertical (2.9:1). The principal spillway rests on overburden or fill and one anti-seep collar was specified in design

(Plate 3, Appendix I). This reportedly was a corrugated metal sheet approximately 6 ft square. A toe drain was not included in the design drawings. The left emergency spillway is in cut material consisting of soil and weathered shale. The smaller right emergency spillway is cut into shale and sandstone bedrock.

2.2 Construction: The construction records are not available. Mr. Verlin Altizer (inspecting engineer for the Owner) and Mr. J. V. Shockley of the Bland County SCS office were both present during construction and were able to supply verbal information related to construction of the dam. The dam was constructed by Mr. Paul E. Delp of Elk Garden, Virginia.

Comparison of design drawings with field inspection data indicates the dam was constructed slightly different than designed. The embankment appears to be 70 ft$^{\pm}$ shorter than specified and the right emergency spillway is approximately 10 ft$^{\pm}$ narrower than shown. Also the left emergency spillway outfall is not as close to the embankment toe as shown on Plate 2, Appendix I, but several hundred feet below the embankment. Embankment slopes of about 2.5 horizontal to 1 vertical were measured during the inspection rather than the 3:1 design slopes. A later survery made by the Owner measured 2.7:1$^{\pm}$ upstream slopes and 2.9:1$^{\pm}$ downstream slopes.

2.3 Operation: There is no known operation and instrumentation procedure. The dam was repaired in 1977 due to erosion in the right emergency spillway.

2.4 Evaluation: Engineering calculations are not avail-

able and there are no records available for dam performance. Although the design drawings show the embankment being constructed slightly different than designed, the drawings are adequate and generally representative of the "as built" structure. If the berm was constructed on the upstream slope as shown on Plate 3, Appendix I, the overall upstream slope would be approximately 2.9:1.

SECTION 3 - VISUAL INSPECTION

3.1 Findings: At the time of inspection the dam was in satisfactory condition. Field observations are outlined in Appendix III.

3.1.1 General: An inspection was made 22 May 1979 and the weather was overcast with a temperature of 60°F. The pool and tailwater levels at the time of inspection were 2363.0 and 2348 M.S.L. respectively, which correspond to normal levels. The ground was wet due to earlier rains. Heavy rain the night before the inspection made it difficult to locate wet spots or potential seepage.

3.1.2 Dam and Spillways: There is tall grass and brush growth (3 to 4 ft) on the downstream slope of the embankment and on the left emergency spillway. Small trees (1 to 3" diameter) were also growing at scattered locations along the downstream slope. Otherwise, vegetation on the dam and the emergency spillways was adequately maintained at the time of the inspection. A series of discontinuous, iron-stained ponded areas approximately 200 ft in total length and several inches deep were present along the toe of the left downstream slope. Occasional turbidity was noted in the water. Scattered iron-stained wet spots and marshy areas were also encountered along the toe of the right downstream slope. A small eroded area approximately 2 ft deep and 8 ft long occurs to the right and directly below the red wooden structure located on the left downstream slope of the embankment. Some minor erosion in the form of shallow washes were observed in the left emergency spillway near its junction with the pool. The upstream slope

included a rather continuously eroded, wave-cut face 3 to 5 ft± above the pool level.

The principal spillway has a 42 inch CMP riser with a 30 inch CMP outlet pipe. The intake is in good condition. No spalling or cracking was observed. A small amount of debris was noted in the trash rack. The 12 inch gate is reportedly operational.

There are two trapezoidal channels; one located on each abutment, used for emergency spillways. They both empty into broad wooded floodplain-type areas. Erosion had occurred in 1977 to the right spillway, but has since been repaired and stabilized.

No faults were observed in the field during this investigation and geologic maps of the area do not show the presence of faults in the immediate vicinity.

3.1.3 Reservoir Area: The shoreline has minor debris collected on and near the embankment. Vegetative growth is also present in the water along portions of the shoreline. Except for the grassed lodge area, the surrounding slopes are heavily wooded and range from gentle to moderately steep or approximately 2:1 to 10:1. No sloughing or surface erosion was observed. Sediment was observed at the upper end of the reservoir.

3.1.4 Downstream Area: The downstream channel showed no erosion and minor debris collection. The channel is not well defined and is generally a broad floodplain covered with brush and trees. Side slopes are approximately 2:1 at the edge of floodplain. The floodplain is approximately 500± ft wide.

Four homes were observed approximately 2500± ft downstream. They appear to be approximately 10 to 15 ft above creek bed (El 2320 M.S.L.). The bridge at Suiter, Virginia, for Rt. 615, is at a lower elevation than the homes.

3.2 Evaluation: Overall, the dam was in satisfactory condition at the time of inspection. However, some minor remedial measures are required. Uncontrolled growth encourages the development of deep rooted vegetation. This type of growth can encourage piping within the embankment. Also, excessive growth inhibits effective visual inspections of the dam. The embankment, including its crest, slopes, and emergency spillway should be mowed at least once a year, but more preferably twice a year. Small trees presently growing on the embankment should be removed.

Scattered iron-stained seepage and marsh vegetation were encountered along the toe of the right downstream slope. Seepage present around the marsh vegetation may be related to springs. Approximately 200 ft of discontinuous iron-stained ponds were present along the left downstream toe. The iron-staining is indicative of long term seepage, possibly through or beneath the dam. The seepage along the left downstream toe is of particular concern ; however, since the inspection was made after considerable rain, the seepage may not be as extensive as it appeared. It is recommended that the seepage areas be monitored quarterly to detect any increase inflow rates which may cause piping within the embankment.

The small eroded area below the red wooden building should be monitored periodically to detect any increase in erosion and seepage.

The wave-cut bench present just above normal pool on the upstream slope should be monitored during normal maintenance and inspection. If increased erosion continues, corrective measures may be required.

3.2.1 Dam and Spillways: Overall, the dam was in satisfactory condition at the time of inspection.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 Procedures: Hunting Camp Lake is used for recreational use only. The normal pool elevation is maintained by a riser-type inlet acting as the principal spil way. During periods of below normal flows, water flow is not maintained through the dam. The dam is used to store water for recreation at all times. During periods of above-normal flows, the pool elevation rises above the riser inlet increasing the flow through the inlet. Large increases in inflows which cannot be absorbed by storage are passed through the emergency spillways when the pool rises above elevation 2366 M.S.L. on the right spillway and elevation 2365 M.S.L. on the left abutment.

4.2 Maintenance of Dam and Appurtenances: Maintenance is the responsibility of Consolidation Coal Company and consists of inspection, debris removal, mowing of the vegetative cover, and repair. The operating appurtenances are reportedly in working order. The vegetative growth on the embankment has been adequately maintained except along the downstream toe and in the left emergency spillway.

4.3 Warning System: No warning system exists.

4.4 Evaluation: The dam and appurtenances are in good operating condition. A more routine maintenance program (mowing, valve checks, and debris removal) should be established.

SECTION 5 - HYDRAULICS/HYDROLOGIC DATA

5.1 Hydrologic Records: There are no records available.

5.2 Flood Experience: The maximum pool elevation observed was in April of 1977; however, maximum pool elevation was not known. Considerable erosion occurred within the right spillway, but this has since been filled and regraded.

5.3 Flood Potential: In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (flood discharges that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible), or fractions thereof. The Probable Maximum Flood (PMF), ½ PMF, and 100-year Flood hydrographs were developed by the SCS method (Reference 4, Appendix V). Precipitation amounts for the flood hydrographs of the PMF, ½ PMF, and 100-year Flood are taken from the U. S. Weather Bureau Information (References 5 and 6, Appendix V). Appropriate adjustments for basin size and shape were accounted for. These hydrographs were routed through the reservoir to determine maximum pool elevations.

5.4 Reservoir Regulation: For routing purposes, the pool at the beginning of the flood was assumed to be at elevation 2363 M.S.L. Reservoir stage-storage data and stage-discharge data were determined from the available plans, field measurement and USGS quadrangle sheets. Floods were routed through the reservoir using the principal spillway

discharge up to a pool storage elevation of 2365 M.S.L. and a combined principal and emergency spillway discharge for pool elevations above 2365 M.S.L.

5.6 Overtopping Potential: The predicted rise of the reservoir pool and other pertinent data were determined by routing the flood hydrographs through the reservoir as previously described. The results for the flood conditions (PMF, ½ PMF and 100 year Flood) are shown in the following Table 5.1.

TABLE 5.1 RESERVOIR PERFORMANCE

	Normal Flow	Hydrograph		
		100 Year	½ PMF	PMF
Peak Flow, CFS				
Inflow	7	4294	12000	23,845
Outflow	7	3749	12000	23,788
Maximum Pool Elevation				
Ft, MSL	-	2367.12	2369.44	2371.48
Non-Overflow Section				
(El 2372 MSL)				
Depth of Flow, Ft.	-	-	-	1.5
Duration, Hours	-	-	-	3
Velocity, fps*	-	-	-	5.3
Emergency Spillway Right				
(El 2366 MSL)				
Depth of Flow, Ft.	-	1.12	3.4	5.5
Duration, hrs.	-	5	7	8
Velocity, fps*	-	6.61	11.6	14.5
Emergency Spillway Left				
(El 2365 MSL)				
Depth of Flow, Ft.	-	2.12	4.4	6.5
Duration, Hours	-	10	13	20
Velocity, fps*	-	11.3	14.4	19.8
Tailwater Elevation				
Ft. MSL	2348	2350	2356	2360

*Critical Velocity at Control Section

5.7 Reservoir Emptying Potential: A 12-inch circular gate at elevation 2351 M.S.L. is capable of draining the reservoir through the 30-inch pipe. Assuming that the lake is at normal pool elevation (2363 M.S.L.) and no inflow, it would take approximately 7 days to lower the reservoir to elevation 2351 M.S.L. There are no methods for lowering the reservoir below this elevation.

5.8 Evaluation: Department of the Army, COE, guidelines indicate the appropriate spillway design flood (SDF) for a small size significant hazard dam is the 100 year flood to ½ PMF. Due to the risk involved, the ½ PMF has been selected or the SDF. The spillway will pass 60 percent of the PMF.

Hydrologic data used in the evaluation pertain to present day conditions with no consideration given to future development.

SECTION 6 - DAM STABILITY

6.1 Foundation and Abutments: The dam site is located within the Valley and Ridge Physiographic Province of Virginia. In the Bland County area, the province consists of an alternating series of parallel ridges and intervening narrow valleys which trend in a northeast-southwest direction. Most ridges are "held up" by sandstones and conglomerates, whereas valleys are underlain by less resistant shales and limestones.

Hunting Camp Dam appears to be founded on alluvial, colluvial and/or residual soils, all of which are underlain by a narrow band of rocks belonging to the Romney Formation. The Romney ranges from approximately 1100 to 1800 ft in thickness and includes three distinct members: an upper black fissile shale, underlain by olive-green shale and sandstone, and a basal black and green shale member. The dam is located near the contact of the Romney Formation and the Brallier Formation which lies to the east. According to the geologic map, the dam may be underlain in part by the Brallier Formation also of Middle Devonian Age. The Brallier consists of green siliceous shale and thin but evenly bedded fine-grained green sandstone. The formation is reportedly 3000 ft thick in Bland County. Gray to brown fissile shale with thin sandstone interbeds (less than 3 inches thick) are exposed in the right abutment. Shale was also exposed in the stream channel located at the northeast end of the left emergency spillway. Geologic maps of the area do not show the presence of faults in the imme-

diate vicinity.

6.2 Embankment: The upstream slope is 2.7 horizontal to 1 vertical with crest at elevation 2370 M.S.L. At elevation 2363 M.S.L. the slope flattens to 5 horizontal to 1 vertical forming a berm for a vertical distance of 2 ft. It is assumed that the slope continues at 2.7 horizontal to 1 vertical to natural ground. The overall upstream slope with berm included is approximately 2.9 horizontal to 1 vertical. Normal pool level is elevation 2363 M.S.L. or 2 ft above the toe of this berm. The downstream slope is 2.9 horizontal to 1 vertical. A general desi section of the dam is included on Plate 3, Appendix I. The embankment is grassed and no riprap was present. Mr. Altizer and Mr. Shockley both stated that all fill was placed in 1± ft layers and compacted with a sheepsfoot roller; however, density tests were not required. Surficial exposures consisted basically of clayey silt to silty clay materials with assorted mixtures of roc fragments. Mr. Altizer and Mr. Shockley both stated that the embankment was constructed with local materials and a core trench extending to rock was included.

The steep slopes which form the right side of the right emergency spillway are cut into partially weathered sandstone and shale and were considered safe and stable at the time of investigation. The cut into residual and colluvial soils along the left side of the left emergency spillway was also considered safe and stable during this inspection.

6.3 Evaluation:

6.3.1 Foundation and Abutments: Dam foundations must be evaluated on the basis of potential settlement, sliding and

seepage. Excessive settlement of the dam is not believed to be a problem because the structure appears to rest upon fairly competent bedrock and alluvial, colluvial, and/or residual soils. Gradual consolidation of underlying soils would be expected during application of fill materials. The underlying soils probably had essentially fully consolidated under the applied load at the end of the construction period.

Sliding within the foundation bedrock does not appear likely based upon the nature of the Romney and Brallier Formations. A review of the geologic data indicates that there are no adversely oriented weak planes within the foundation rock that would act as a potential sliding plane. In addition, the relatively high ratio of base width to height of this dam reduces the possibility of sliding of the dam along the interface between the embankment and the foundation soil or rock.

The possibility of seepage within the foundation exists, since the dam is founded at least in part on alluvial, colluvial or residual soils of assorted compositions. Examination of bedrock exposed in the right abutment indicates that much of the underlying shale and sandstone would be fractured enough to allow seepage beneath the dam. The need for seepage control was apparently recognized because Plate 3, Appendix I shows that a core trench with a corrugated metal diaphragm was included in the design.

Since complete design and construction data were not available, an accurate determination of the foundation conditions under the cutoff trench is not possible. It is not known whether seepage could be passing through the embankment or beneath the cutoff trench.

6.3.2 Embankment: The iron-stained ponded areas located along the left downstream toe are of concern. Iron-staining is often an indicator of long term seepage. The origin of the seepage could not be determined, but it is believed to be passing through the embankment soils or through fractures in the underlying bedrock. Design data supplied by the owner does not indicate the presence of a toe drain or drainage blanket. Previous rainfalls probably resulted in additional ponding along the downstream toe, therefore the seriousness of the seepage could not be assessed. It is recommended that the downstream toe be examined during dry weather to locate specific areas of seepage and estimate flow rates. Afterward, seepages should be monitored quarterly to detect any increase in flow rates which could result in piping through the embankment.

An accurate check on the stability of this structure cannot be made since stability calculations, "as built" drawings and construction records are not available.

The downstream embankment slope meets the the requirements recommended by the U. S. Bureau of Reclamation; however, the upstream slope is slightly steeper than recommended when subject to rapid drawdown. Since no undue settlement, cracking or seepage was noted at the time of inspection, it appears that the

embankment is adequate for normal pool level with water at elevation 2363 M.S.L. Since the rapid drawdown stability is in question, the water level in the dam should not be lowered at a rate exceeding 6 inches per day. If this is not acceptable, a geotechnical engineering study is recommended in order to evaluate in detail the actual stability of the dam, including the rapid drawdown condition.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment: Hunting Camp Dam at the time of inspection appeared sound and in a safe operating condition. The spillways will pass 60 percent of the PMF without overtopping the dam. The SDF is the ½ PMF. The spillways will pass the ½ PMF and are considered adequate.

Based on the visual inspection and review of existing data, there is no apparent problem that would require immediate action for the normal pool conditions. The actual embankment structure appears to be slightly different than shown on the design drawings; however, the deviations from the plans are not considered serious. Without construction records, the conformance of the embankment material properties to design requirements cannot be assessed. The downstream embankment slope meets the requirement recommended by the U. S. Bureau of Reclamation (Reference 2, Appendix V); however, the upstream slope is slightly steeper than recommended when subject to rapid drawdown.

7.2 Recommendations and Remedial Measures: An accurate check on stability could not be made since sufficient design data, calculations and construction records were not available. Since only the rapid drawdown stability condition appears to be in question, the lake level should not be lowered at a rate exceeding 6 inches per day. If this is not acceptable, the Owner should provide a geotechnical engineering study which evaluates in detail the actual stability condition of the dam.

7.3 Remedial Measures:

7.3.1 A staff gauge should be installed to monitor water levels.

7.4 Required Maintenance:

7.4.1 The grass and weeds on the embankment and the emergency spillway should be cut at least once and preferably twice a year. We would recommend maintenance in the early summer and fall.

7.4.2 Removal of all small trees or saplings, as they exist, from the above described areas should be accomplished yearly.

7.4.3 The eroded area located below the red wooden building along the donwstream slope should be examined during the maintenance operations to detect any increase in erosion and/or the development of seepage within the embankment.

7.4.4 Seepage present along the downstream toe, particularly along the left side should be monitored quarterly to detect any increase in flow rates which may cause piping within the embankment.

7.4.5 The wave-cut face present just above normal pool on the upstream slope should be examined quarterly to see if it has stabilized. Increased erosion may require corrective maintenance procedures, such as installation of riprap or the placement and compaction of additional fill materials.

APPENDIX I

MAPS AND DRAWINGS

Suiter

RTE. 61B

RTE. 615

Laurel

Gate

POCAHONTAS FUEL
LAKE DAM

BRUSHY MOUNTAIN

JEFFERSON

Hunting

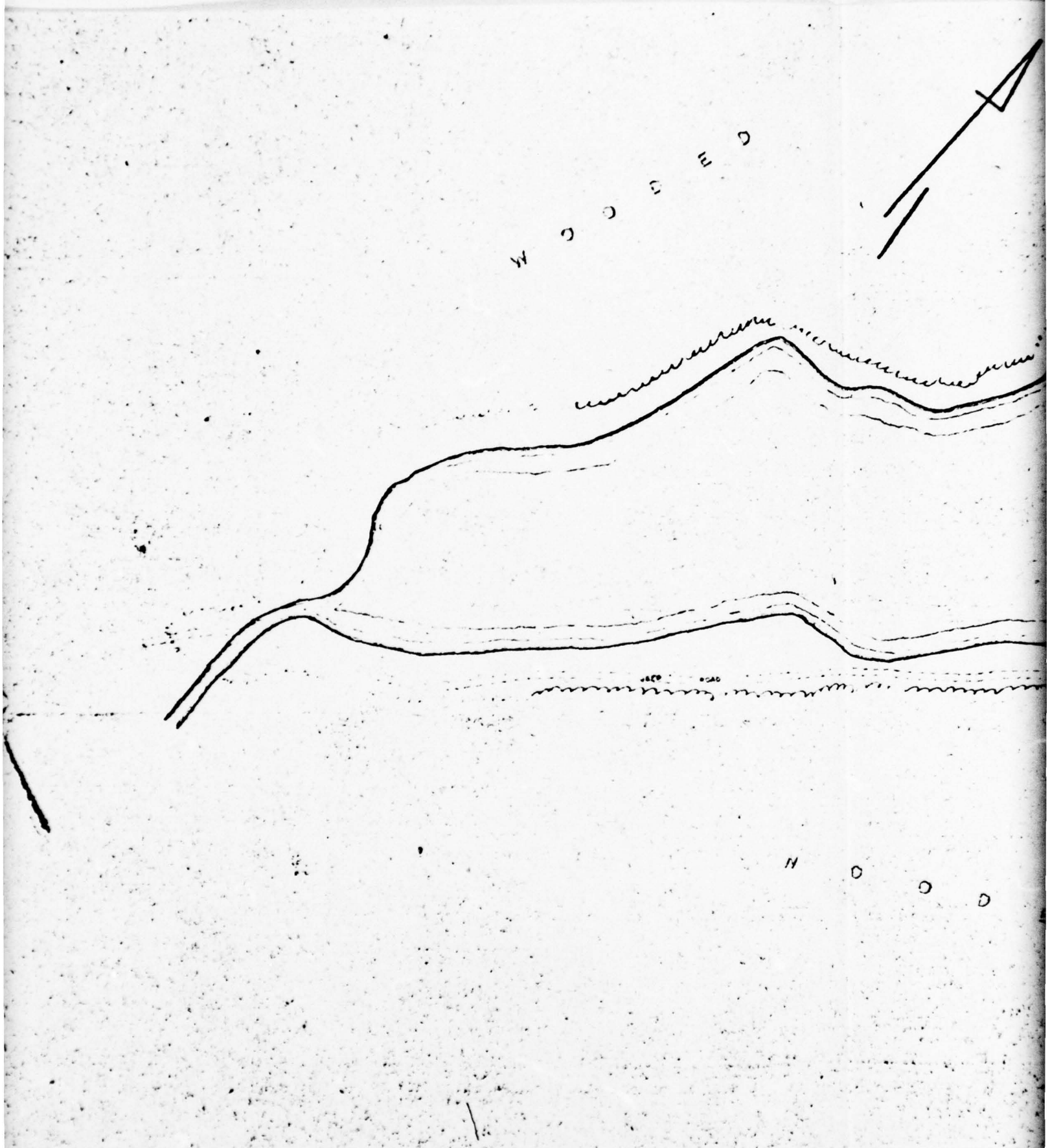
Creek

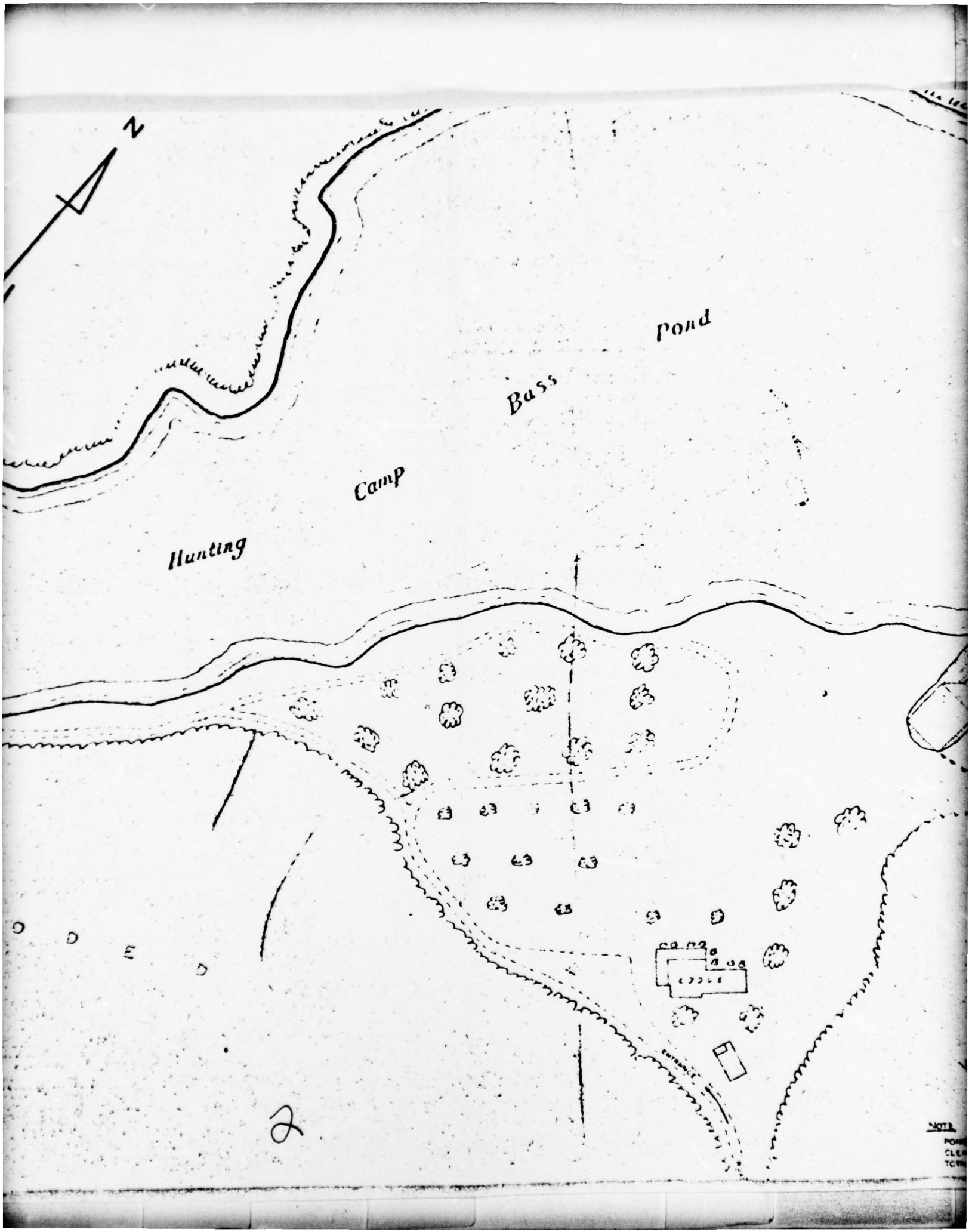
Wolf

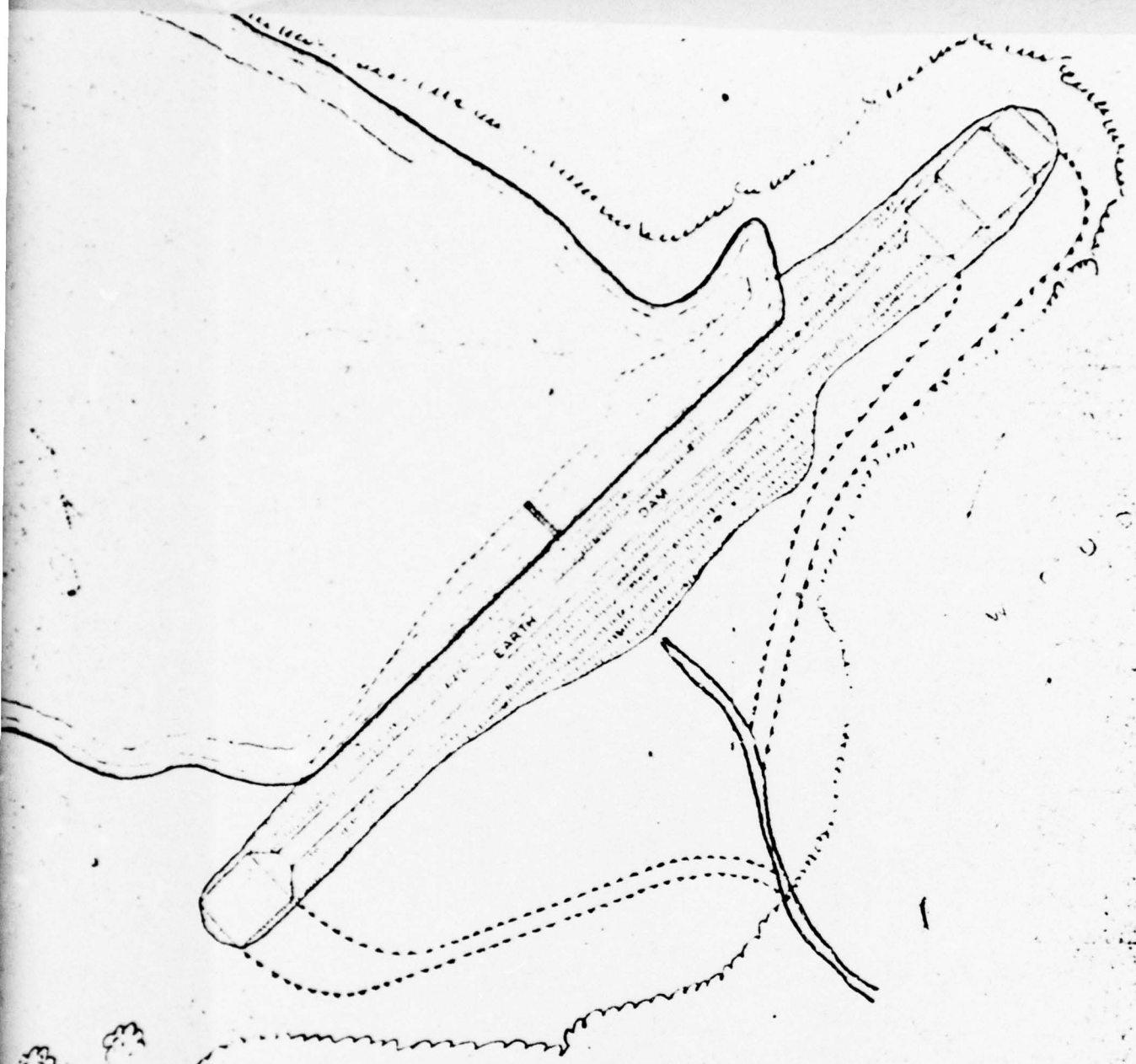
Little

SCALE: 1" = 2,000'
PLATE NO. 1

BIG BEND, VA.
SW/4 BLAND 15' QUADRANGLE
N3700—W8107.5—7.5


W O O D E D
N O O D


N
Bass
Pond
Camp
Hunting



HUNTING CAMP CREEK
BASS POND
ON
WATERS OF
HUNTING CAMP CREEK
AND PLATE NO2
LANDS OF POCAHONTAS FUEL CO
BLAND CO., VA.

NOTE

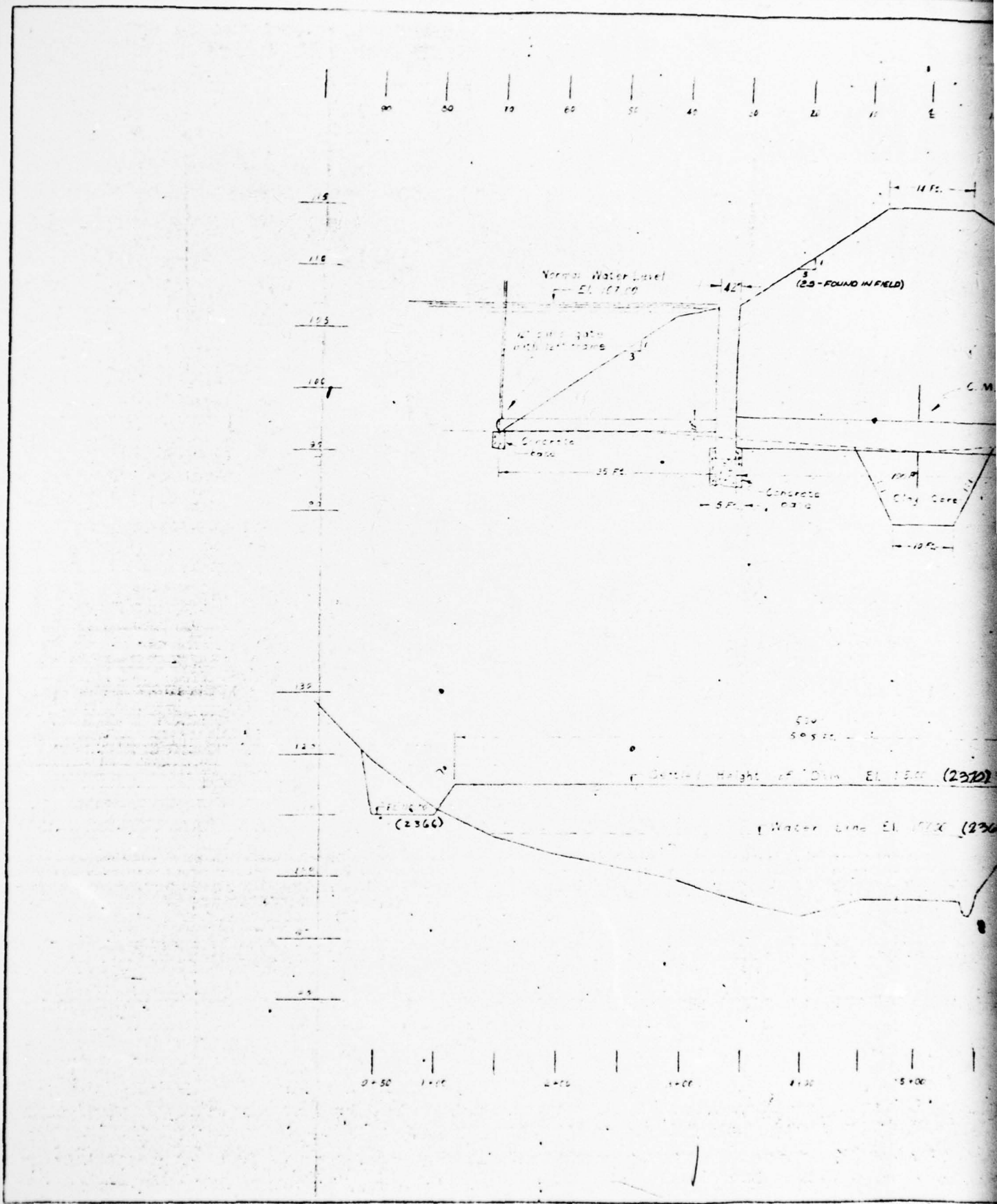
POND AREA (AT ELEVATION 0?)	13.4? ACRES
CLEARED AREA AROUND POND AND DAM	4.3? ACRES
TOTAL CLEARED AREA (POND AND SURROUNDING AREA)	17.7? ACRES

SCALE - 1" = 50' JULY 25, 956

HUNTING CAMP CREEK
BASS POND
ON
WATERS OF
HUNTING CAMP CREEK
AND PLATE No 2
LANDS OF POCAHONTAS FUEL CO. INC.
BLAND CO., VA.

4

SCALE - 1" = 50' JULY 25, 1956


14 Ft.
Normal Water Level
El. 107.00
42'
3
1
(2.5 - FOUND IN FIELD)
3
Concrete
Cap
35 Ft.
5 Ft.
Concrete
Core
Clay Core
10 Ft.
(2366)
(2370)

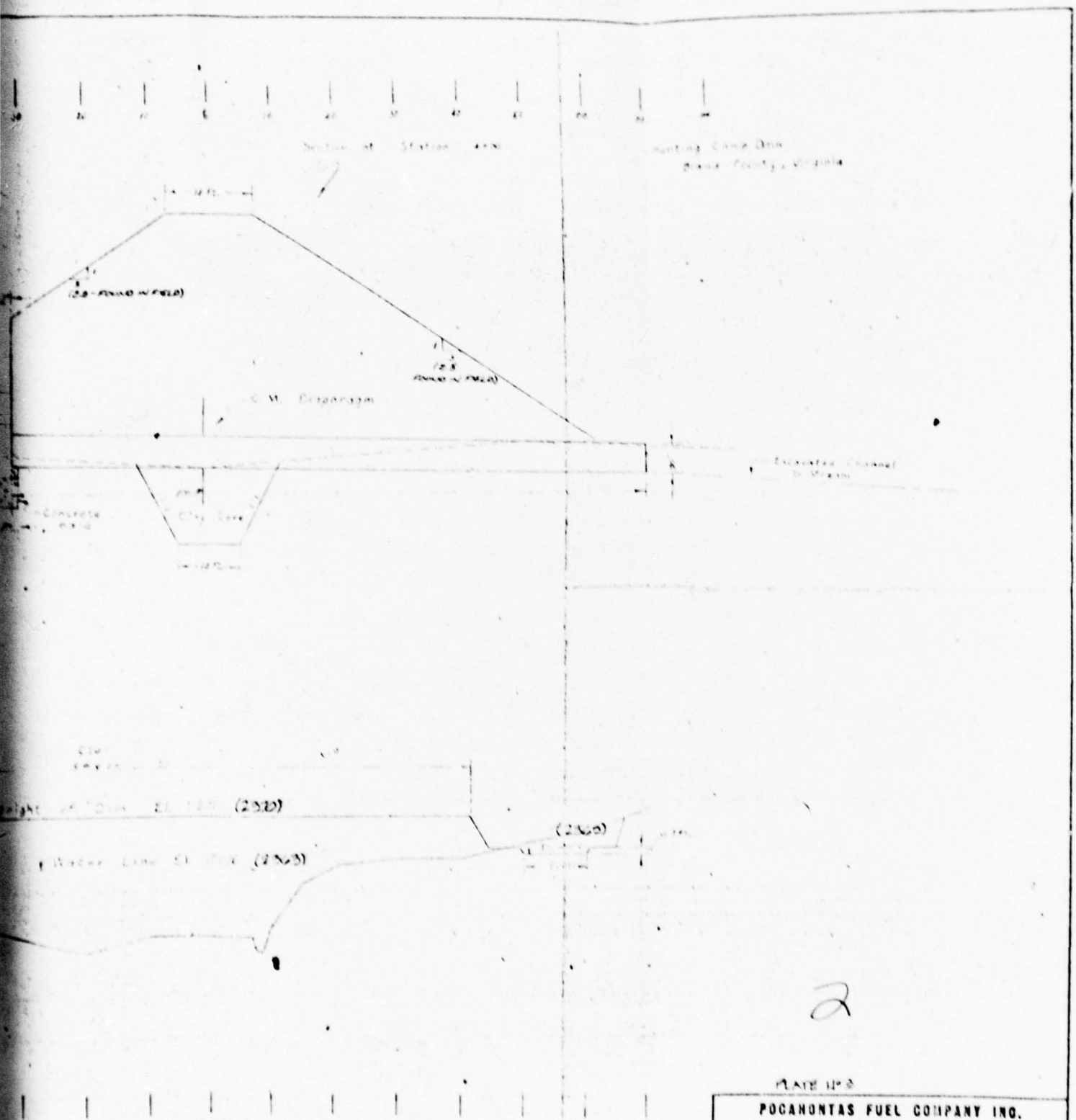
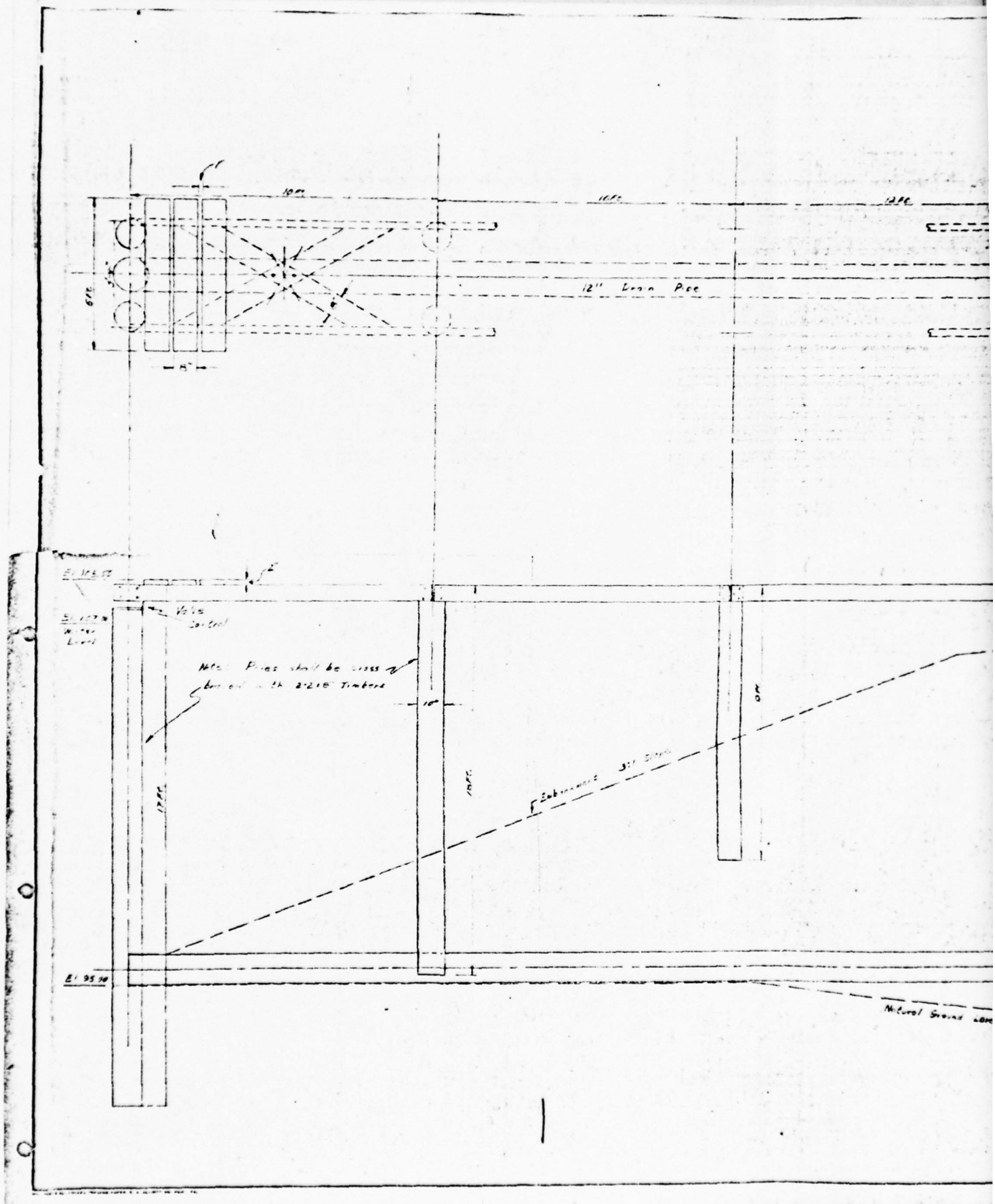


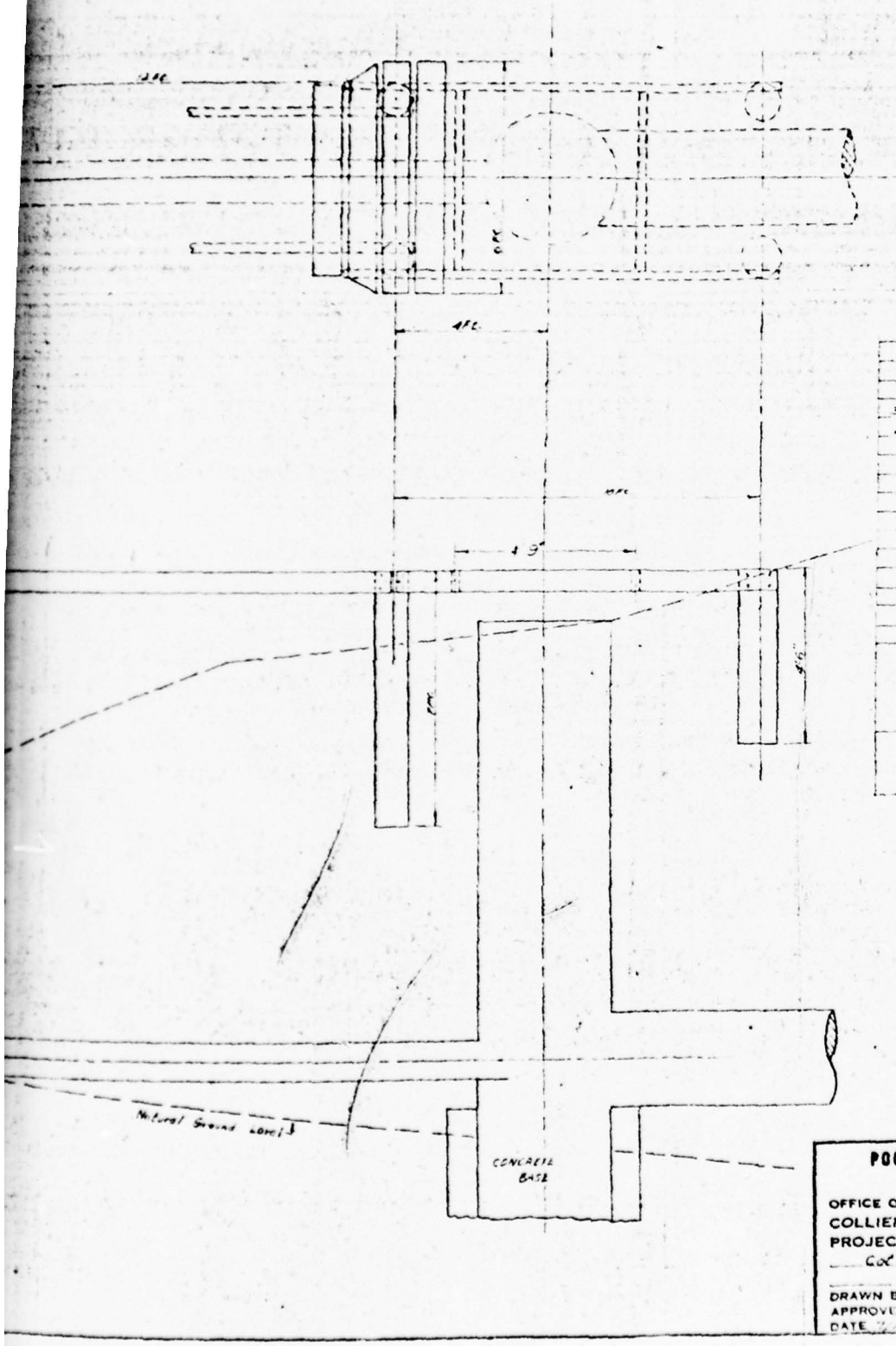
PLATE II-2

POCAHONTAS FUEL COMPANY INC.
POCAHONTAS, VA.

OFFICE OF CHIEF ENGINEER
COLLIERY BLAND COUNTY, VIRGINIA
PROJECT EARTH DAM
PROFILE & SECTION

DRAWN BY [illegible] P. A. NO.
APPROVED AS TO ENGINEERING
DATE [illegible] SCALE [illegible]


12" Drain Pipe
Valve Control
Embankment 3:1 Slope
Natural Ground



Bill of Materials
3 - Pieces 2" x 8" - 8 Ft. long
35 - Pieces 2" x 8" - 10 Ft. "
15 - " 2" x 8 - 12 Ft. "
Poles 12' Min. Diameter
2 - 17 Ft. long
2 - 13 Ft. "
2 - 9 Ft. "
2 - 7 Ft. "
2 - 4 Ft. "
Galvanized Bolts with Nuts
½" x 12" - 75
½" x 6" - 12
½" Washers - 200
Note: All wood shall be pressure treated with Creosote
25 lbs 20 Penny nails

2

PLATE No 4

POCAHONTAS FUEL COMPANY INC.
POCAHONTAS, VA.

OFFICE OF CHIEF ENGINEER
COLLIERY BLAND COUNTY VA.
PROJECT Hunting Camp Creek Dam
Cut Walls and Trash Rack

DRAWN BY RBC P. A. NO.
APPROVED AS TO ENGINEERING
DATE SCALE

SCS-VA-102 (Rev)
1-12-56

DESIGN DATA

Watershed Area, A = _____ Acres Length, L = _____ feet

Width, W = $\frac{(A)\_\_\_\_ \times 43560}{(L)\_\_\_\_}$ = ____ feet L/W = _____

Average Slope = _____ % Relief = _____

Typical Soils _____ Infiltration = _____

Portion in good cover _____ % Cover = _____

S. Storage = _____

Σ w = _____

P = _____ F = _____ R = _____ S = _____

Q = ____ x P x F x R x S = _____ c.f.s.

Spillway bottom width = _____ feet Stage = _____ feet

Slope of exit section = _____ % Side Slopes _____

GENERAL INFORMATION

Uses for Impounded Water Recreation

Area at Normal Pool = _____ Acres Maximum depth

Capacity = 0.40 x _____ ac. x ____ feet = _____

EARTH QUANTITIES

Embankment	19,400
Excavation of Cutoff Trench	
Excavation of Stream Channel	
Other Excavation	
Total	

BENCH MARK DESCRIPTION

_____

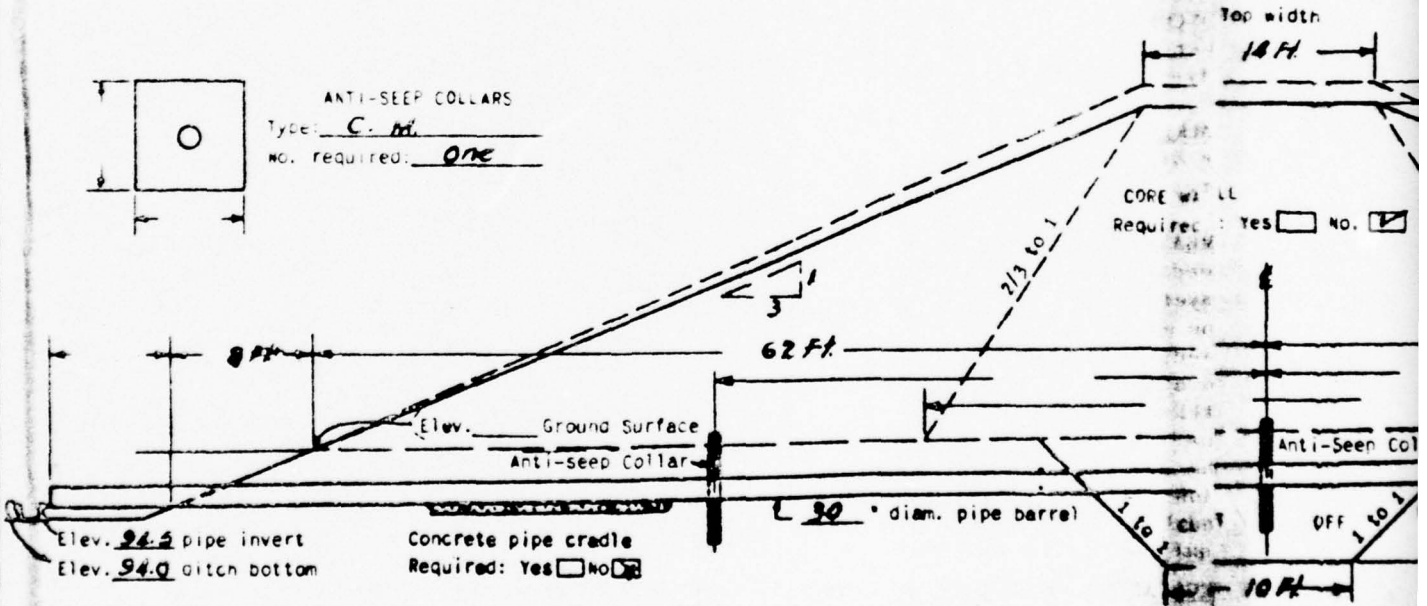
_____

_____

ANTI-SEEP COLLARS

Type: C. Rd.

No. required: One



SECTION THROU[GH] FILL ALONG
STATION [0+]00 ON CENTE[R]

CERTIFICATION

I certify that I have made, or caused to be made, a final inspection of this pond project and that all work related thereto has been completed in accordance with these plans and with all other applicable specifications except as listed on the attached sheet.

(Check here ☐ if no exceptions)

Signed _____ Title _____ Date _____

GENERAL INFORMATION

Water Per creation

Area = _____ Acres Maximum depth = _____ feet

_____ ac. x _____ feet = _____ acre feet

EARTH QUANTITIES

19,400 cu. yds.

Cut-off Trench _____ cu. yds.

Spillway Channel _____ cu. yds.

_____ cu. yds.

Total _____ cu. yds.

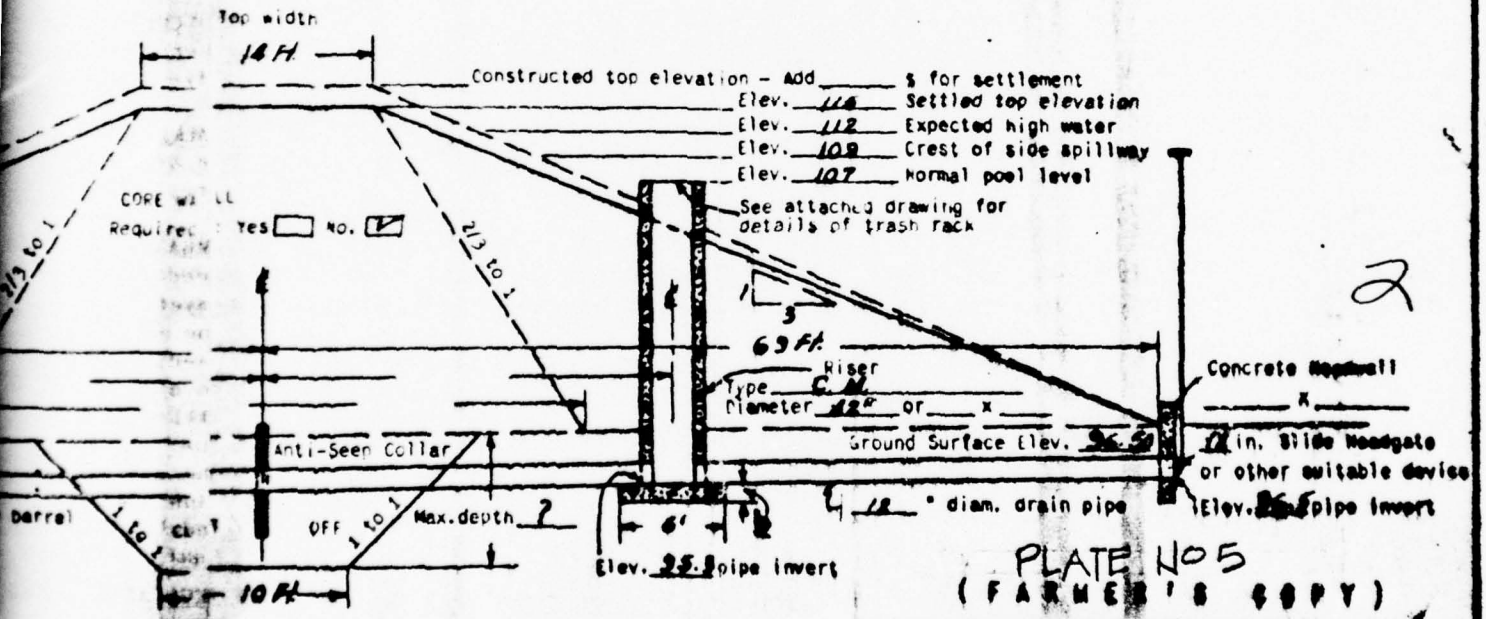
BENCH MARK DESCRIPTION

_____

_____

_____

BILL OF MATERIALS



2

SECTION THROUGH FILL ALONG CONDUIT
STATION 4 + 00 ON CENTERLINE

PLATE NO 5
(FARMER'S COPY)

PLAN OF FARM POND
Alexander Lewis Farm
Bland County, Virginia

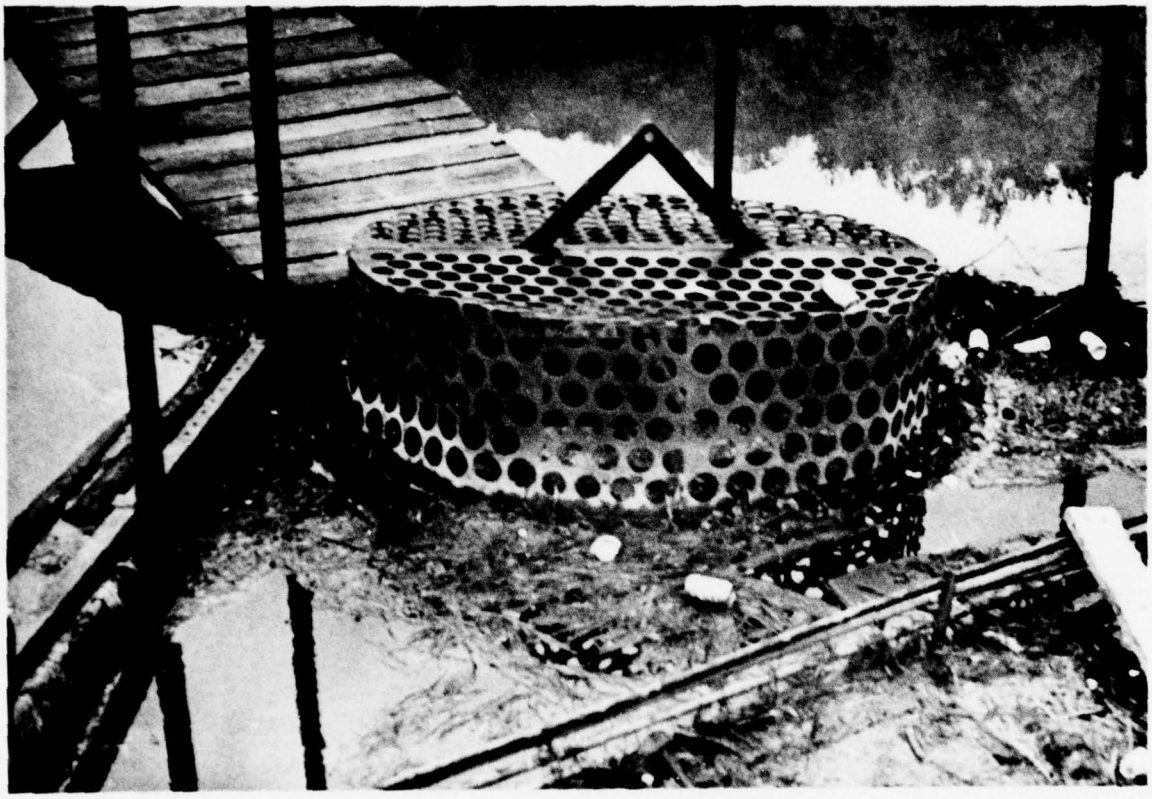
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

APPENDIX II

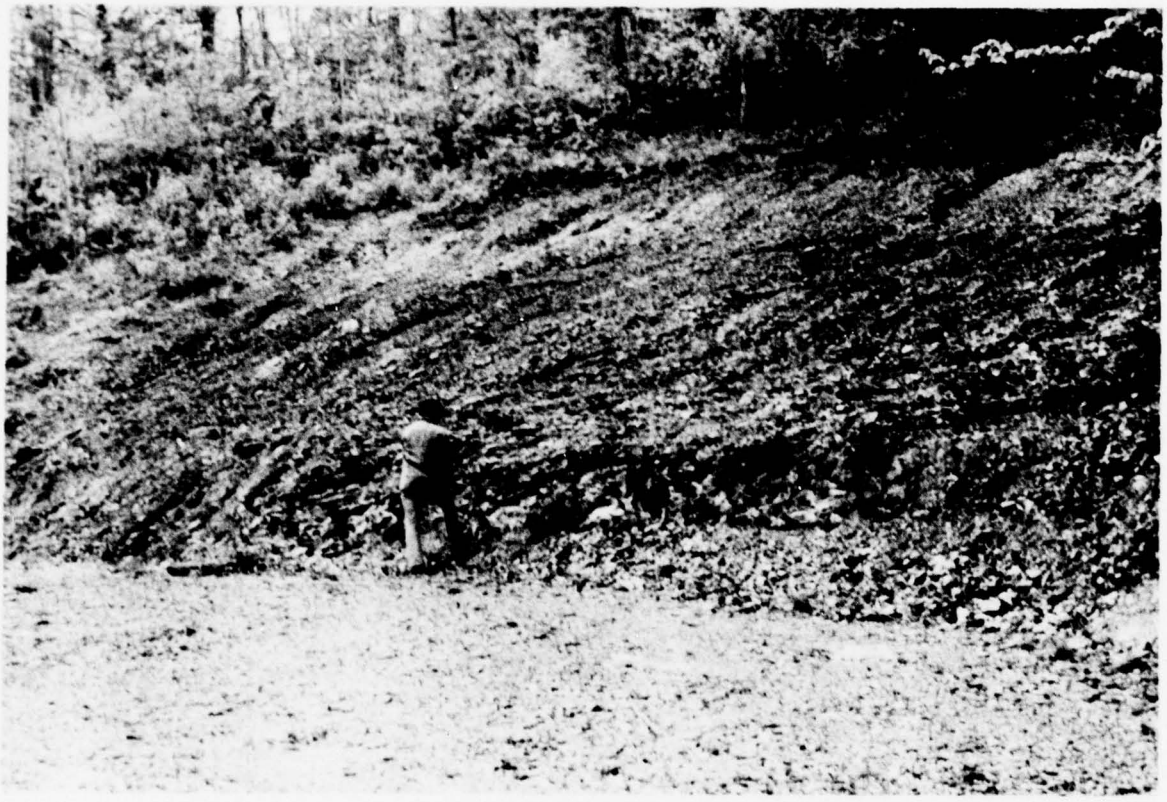
PHOTOGRAPHS

CLOSE-UP OF OUTLET PIPE

SPILLWAY IN RIGHT ABUTMENT
(Outlined with Arrows)



CLOSE-UP DEBRIS RACK AT 42" INTAKE



VIEW OF BORROW AREA FOR REPAIR OF SPILLWAY

VIEW OF LEFT EMERGENCY SPILLWAY

VIEW OF OUTLET STRUCTURE LOOKING DOWNSTREAM

BLAND CO., VA.

SCALE - 1" = 50' JULY 25, 1956

VIEW OF DOWNSTREAM FLOODPLAIN

VIEW OF POSSIBLE SEEPAGE

APPENDIX III

FIELD OBSERVATIONS

FIELD OBSERVATIONS

Name of Dam: Hunting Camp Dam

County: Bland

State: Virginia

Coordinates: Lat 37°-06.3' Long 81°-14.1'

Date of Inspection: May 22, 1979

Weather: Overcast, temperature 60°F

Pool Elevation at Time of Inspection: 2363.0 M.S.L.

Tailwater at Time of Inspection: 3" in outlet structure

Inspection Personnel:

Schnabel Engineering Associates, P.C.
Ray E. Martin, P.E.*
Stephen G. Werner (recorder)

J. K. Timmons and Associates, Inc.
Robert G. Roop, P.E.
William A. Johns (recorder)

Consolidation Coal Company
Claude Morgan

State Water Control Board
Hugh Gildea, P.E.

1 Embankment:

1.1 Surface Cracks: The slopes, crest, emergency spillway, and abutment contacts were inspected and no cracks were noted. The downstream portion of the embankment and the spillway were covered with 3 to 4 ft high grass and brush, making observations difficult. Small (1 to 3" diameter) trees were also growing at scattered locations along the downstream slope.

*Not present during May 22, 1979 inspection, but visited dam on June 11, 1979.

1.2 Unusual Movement: No unusual movements were noted on the dam or downstream beyond the embankment toe.

1.3 Sloughing or Erosion: No sloughing was noted; however, an eroded area approximately 2 ft deep and 8 ft long exists along the left downstream slope just below the red wooden structure. The upstream slope included an eroded wave cut bench approximately 3 to 5 ft above the pool level. Minor erosion in the form of shallow gullies or washes were encountered at the west end of the left emergency spillway near pool level.

1.4 Alignment: The vertical and horizontal alignment of the dam appeared to be good.

1.5 Riprap: No riprap was observed.

1.6 Junctions: The right abutment ties into gray to brown fissile shale with thin (less than 3" thick) sandstone interbeds. Bedrock strikes 52 degrees northeast, dips 16-19 degrees to the southeast and plunges 17 degrees to the northeast. Joint sets of N5W, 59SW and N88E, 78NW were measured. The left abutment and spillway appear to tie into colluvial and residual (decomposed shale) soils. The emergency spillway terminates in clayey sand to silty clay materials, containing gravel and boulders. Shale exposed in the spillway strikes 33 degrees northeast and dips 24 degrees to the southeast. Rectangular joint patterns were observed in the rock. No faults were encountered.

1.7 Seepage: Scattered iron-stained wet spots and marshy areas were encountered along the right downstream toe

of the dam. A 200 ft long series of discontinuous ponds were present along the left downstream toe. The entire area is marshy and includes strong iron staining. No flow was actually observed; however, considerable iron staining present in the bottom of the shallow ponded area indicates long term seepage. Turbidity was not present on the second site visit.

2 Outlet Works:

2.1 Outlet Conduit: 30 inch CMP. Some corrosion but not significant.

2.2 Intake Structure: In good condition.

2.3 Outlet Structure: In good condition.

2.4 Outlet Channel: Broad, wooded floodplain. No riprap and minor erosion observed.

2.5 Emergency Gate: 12 inch, operable.

3 Emergency Spillway:

3.1 Approach Channel: Fair condition. Some minor weeds.

3.2 Discharge Channel: Erosion on right secondary spillway, but repaired.

4 Reservoir:

4.1 Slopes: Gentle to moderately steep, heavily wooded slopes bound the reservoir. Estimated variation of 2:1 to 10:1. No sloughing or failure of these slopes was observed.

4.2 Sedimentation: Sedimentation observed in upper end.

5 Downstream Channel:

5.1 Condition: Heavily wooded along the sides.

5.2 Slopes: Heavily wooded gentle slopes, which steepen locally, bound the stream channel. Generally estimated as 2:1.

5.3 Population and Facilities: Four homes exist some 2500 ft± from the impoundment.

6 Instrumentation:

6.1 Monumentation: None.

6.2 Observation Wells and Piezometers: No observation wells or piezometers were noted in the field.

APPENDIX IV

SLOPE MEASUREMENTS

CONSOLIDATION COAL COMPANY
INCORPORATED
SOUTHERN APPALACHIA REGION
POCAHONTAS, VIRGINIA 24635

August 29, 1979

Mr. Robert Gay
State Water Control Board
Post Office Box 11143
Richmond, Virginia 23230

Dear Mr. Gay:

Re: Cross-sections, Hunting Camp Dam, near Bastian, Bland County, Virginia

Per our recent telephone conversation, I am forwarding the enclosed cross-sections of our Hunting Camp Dam.

As you can see, except for the wave erosion on the upstream slope, the slopes are approximately 2.7 to 2.8:1. This is considerably better than the 2.5:1 slope indicated in the Corps of Engineers Phase I Inspection Report.

I really appreciate you extending the comment period on the Phase I Report and allowing us to comment on this critical area of the report.

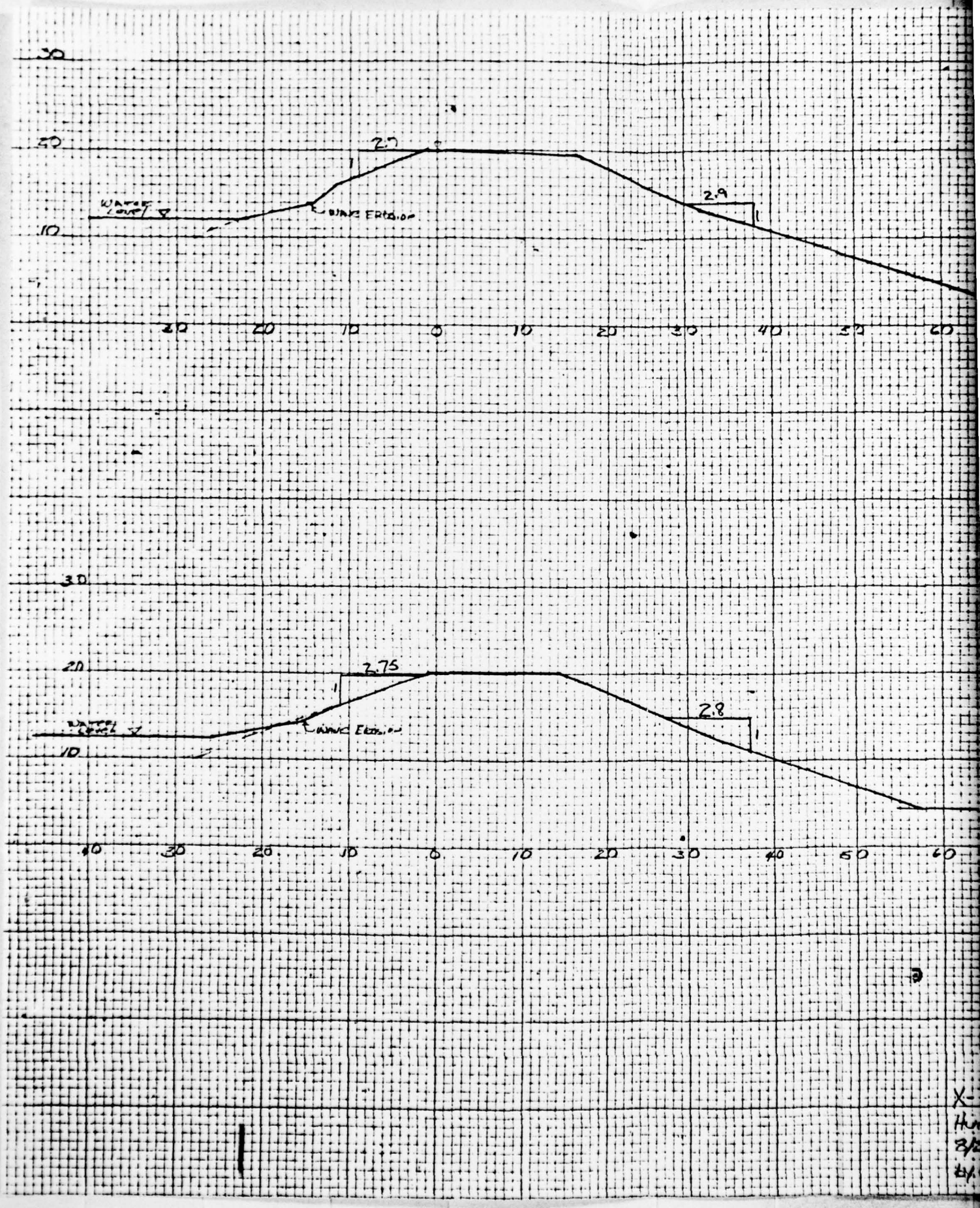
Should you have any questions, please advise.

Yours very truly,

Claude D. Morgan

Claude D. Morgan
Supervisor - Design and Construction

CDM/eee
Enclosure
Copy to: Mr. J. M. Richards
Mr. T. J. Sawarynski


30
20
10
2.7
1
WATER LEVEL
WAVE ERosion
2.9
1
-30
-20
-10
0
10
20
30
40
50
60
30
20
10
2.75
1
WATER LEVEL
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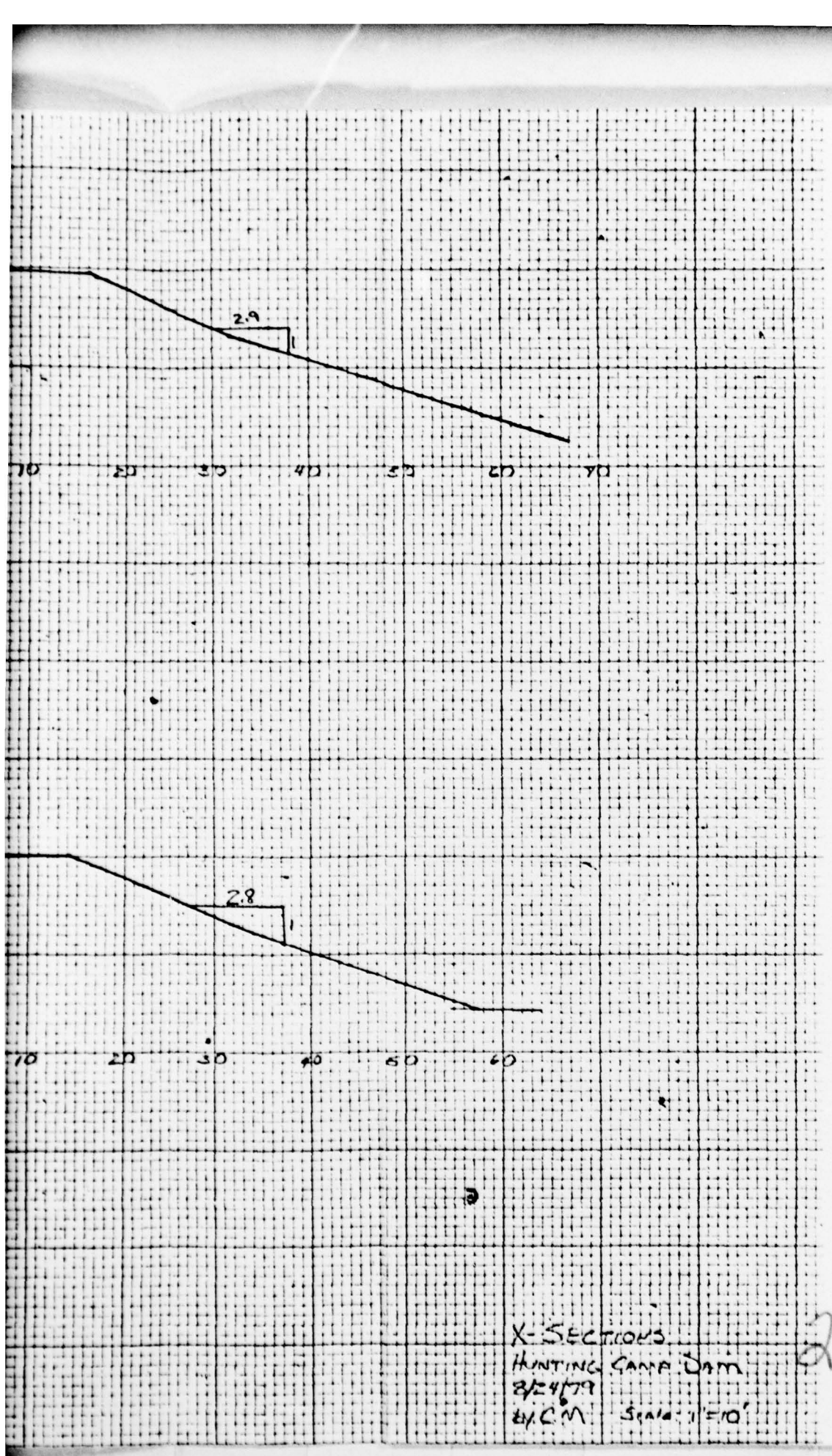

X-SECTIONS
HUNTING CAMP DAM
8/24/79
BY C.M. SCALE: 1"=10'

2

APPENDIX V - REFERENCES

1. Recommended Guidelines for Safety Inspection of Dams. Department of Army, Office of the Chief of Engineers, 46 pp.
2. Design of Small Dams, U.S. Department of Interior, Bureau of Reclamation, 1974, 816 pp.
3. Geology of the Appalachian Valley in Virginia, Bulletin No. 52 (Part 1), Charles Butts, Virginia Division of Mineral Resources, 1940, 568 pp.
4. Section 4, Hydrology, Part 1, Watershed Planning, SCS National Engineering Handbook, Soil Conservation Service, U.S. Department of Agriculture, 1964.
5. Hydrometerologic Report No. 33, U.S Department of Commerce, Weather Bureau, U.S. Department of Army, Corps of Engineers, Washington, D.C., April 1956.
6. Technical Paper No. 40, U.S. Department of Commerce, Weather Bureau, Washington, D.C., May 1961.